

Construction Guide of TH300S

TH300S is a 2-band SSB/CW transceiver, used with DDS as LO, and features dual operation system – ham band and general coverage band. A doubly balanced diode ring mixer is used at the front end, offering good performance. 4 diodes are used for the product detector to handle strong signals and offer low noise.

Ham Band

B1: 7.000 – 7.500

B2: 14.000 – 14.500

General Coverage Band (GENE)

B1: 4.000 – 7.500

B2: 7.5 – 14.500



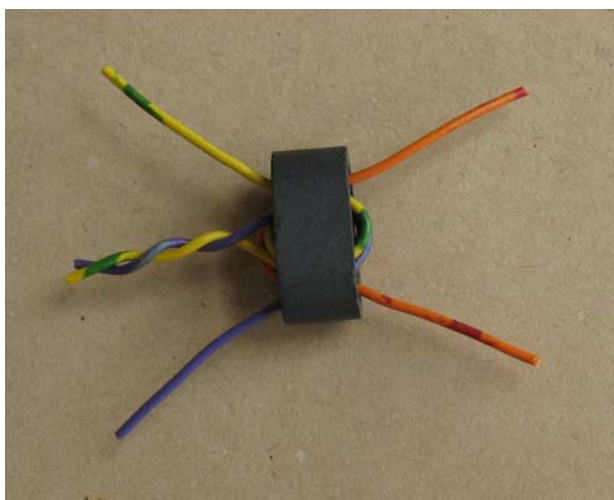
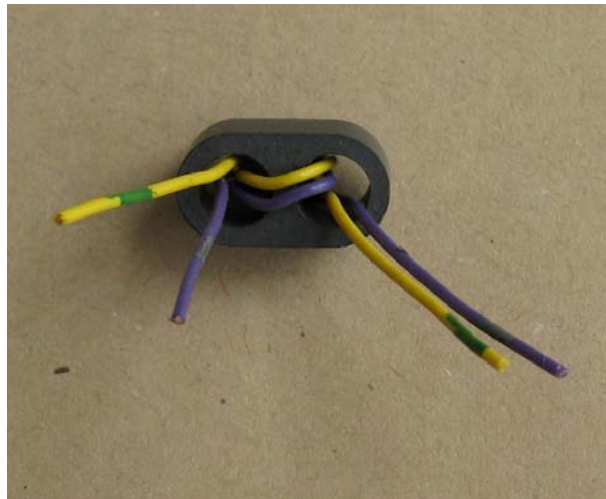
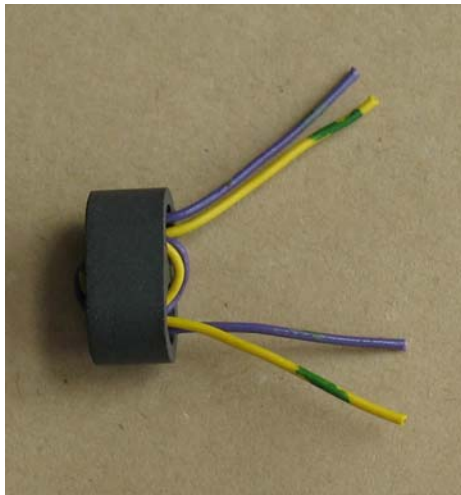
Construction

Main Board

L1 (Optional)

9 MHz trap for conditions where there is a radio broadcast signal near 9 MHz when Panda 1 is used for 40 meter band. L1: 0.1 wire, 16 turns on the can former, C1 151.

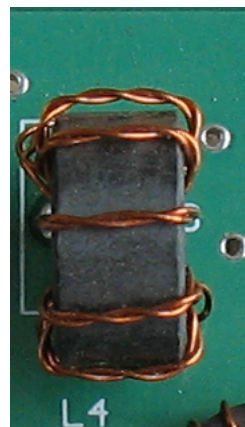
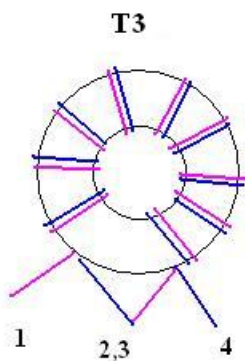
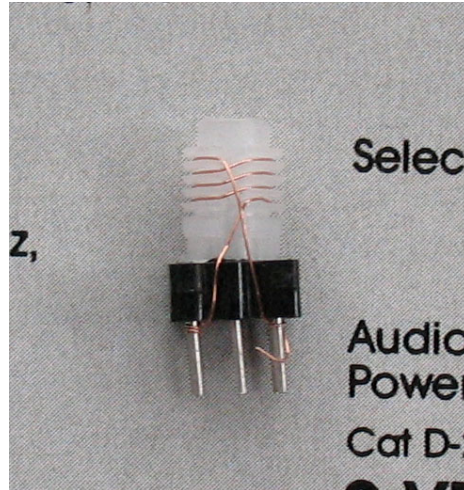
T1, T2: Mixer transformer. Thread a pair of 0.1 wires through the miniature binocular core, 6 turns. Then thread another piece of 0.1 wire from the other direction, 6 turns. See photo (For a clear instruction, a bigger core and colored thicker wires are used). The start of one wire (in the photo case, yellow) is connected with the end of the other wire (in the photo case, purple) to act as a tap. Solder the mixer transformers to the board, and fix them with a tape. The temperature of the solder will remove the lead enamel



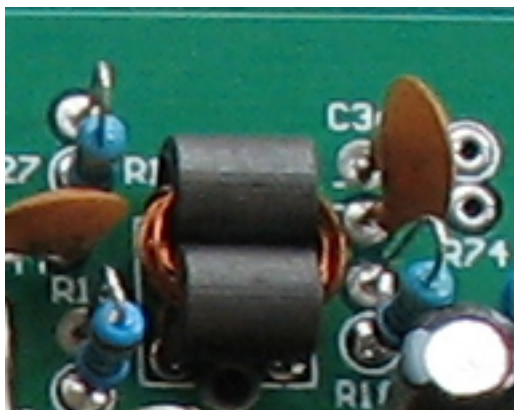
L2, L3: 40m Band-pass filter. 0.1 wire, 18 turns on the can former, spread in 3 slots.

L4, L5: 20m Band-pass filter. 0.1 wire, 12 turns on the can former, spread in 4 slots. The photo on the right shows 4 turns, spread in 4 slots.

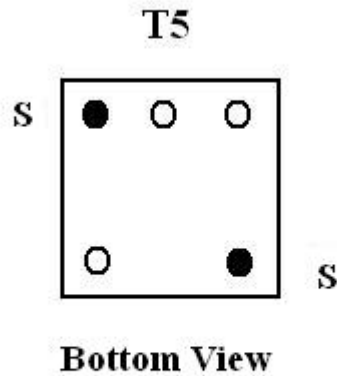
T3: Broad-band ferrite transformer, 8 bifilar turns, 0.31 wire, on the broadband core (single core package). The wires are twisted. See photo. Pay attention to the phase. 3 and 2 are connected as the tap.



T4: IF transformer. Use 2 sleeves to form a binocular core. 0.31 wire, primary (crystal side) 5 turns, secondary 10 turns. It can be solder directly on the board,



T5: Use the can former. 0.1 wire, primary (the 3-pin side) 16 turns, counter clockwise, the turns spread in 4 slots. Secondary (2-pin side), 4 turns in the bottom slot, counter clockwise. Wind the 2-pin side first. Pay attention to the start. See the illustration.



T6, T7: Can former, 0.1 wire. Primary (3-pin side) 15 turns, counter clockwise, spread in 4 slots; secondary 6 turns in the bottom slot, counter clockwise. Wind the secondary first.

T8, T10 (40m BPF) : Can former, 0.1 wire. Primary (3-pin side) 18 turns, spread in 4 slots; secondary 6 turns in the bottom slot. Wind the secondary first.

T9, T11 (20m BPF) : Can former, 0.1 wire. Primary (3-pin side) 12 turns, spread in 4 slots; secondary 4 turns in the bottom slot. Wind the secondary first.

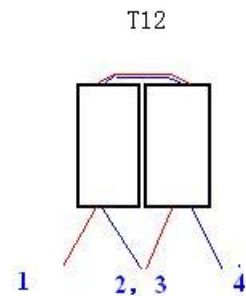
L6: 21 turns, 0.31 wire, on NXO-10 toroid core.

L7: 30 turns, 0.1 wire on can former, spread in 5 slots.

RFC1: Not critical, 3 turns on the small toroid core.

T12: Broad band transformer. 5 bifilar turns, 0.31 wire, on the binocular core formed by 2 sleeves. See photo. Pay attention to the phase. 3 and 2 are connected as the tap.

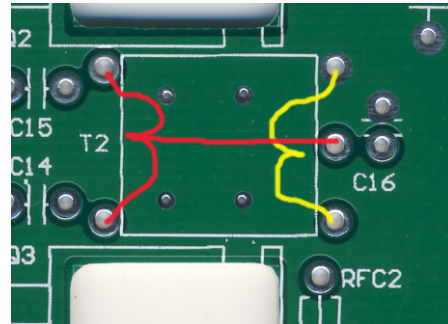
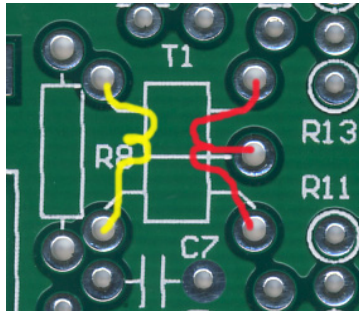
The 0.1 mm wire needs not removing the lead enamel.
The temperature of the solder will remove the lead enamel.
0.31 mm wire needs removing the lead enamel with a knife and tin them before soldering the transformer to the PCB.



PA

T1: Primary (yellow) 4 turns 0.38 wire or insulated wire on the binocular core; secondary (red) 2 turns, center tapped. See photo.

T2: Stack two binocular cores. Primary (red) 2 turns 0.38 - 0.47 wire or insulated wire on the stacked binocular core, center tapped; secondary (yellow) 3 turns. See photo.



RFC1, RFC2, RFC3:

Not critical, 3 turns on the small toroid ring, 0.47 wire. Smaller wire gauge can be used for RFC3.

L5, L6 (40 m) : 0.31 or 0.47 wire, 16 turns on NXO-10 core.

L3, L4 (20 m) : 0.31 or 0.47 wire, 11 turns on NXO-10 core.

Definition of interfaces on main board

LO IN: LO input port, connected to the DDS output port via a coaxial cable

SP: AF output port, Connected to the speaker

VOL: Volume control, connected to the 10K pot

MIC: Microphone port, connected to the microphone

AUX: 12 V port to supply power to DDS module

MODE: Mode switch, connected Mode switch

KEY: CW key, connected to the key

PTT: Push to talk

ANT: Antenna

12V: Power in

The following main board interfaces are connected with the related PA interfaces using pins.

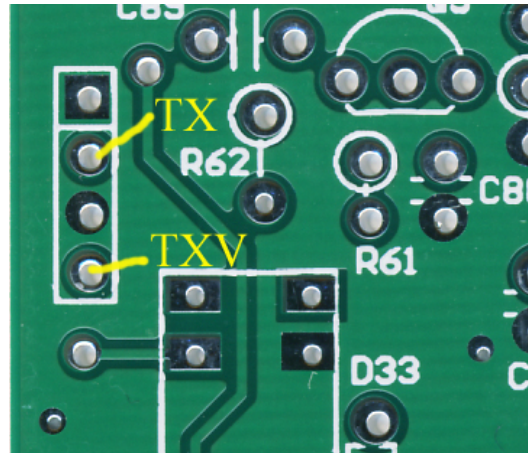
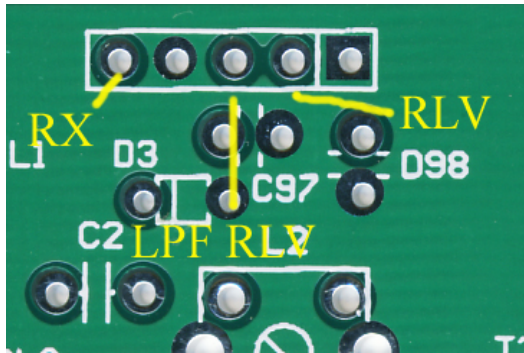
RX: Receiving signal in

LPF RLV: LPF relay control port

RLV: T-R relay control port

TX: Transmitting signal output

TXV: Transmitting power for the driver and bias of PA



Alignment

BF0

Set the mode to LSB. Connect a frequency counter to the emitter of Q3. Turn the slug of L7, until the reading is around 8.99778 – 8.9980MHz.

Set the mode to USB. Adjust VC1 until the reading is around 9.0008 – 9.001MHz. A 2.2 – 4.7P ceramic for VC1 will meet the requirement. A var cap of 1/10P can also be used.

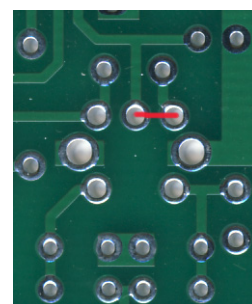
Check CW mode frequency. Disconnect PA board. Set the mode to CW. Short CW key, see if the reading is around 8.99880. In reality a 471 ceramic for VC2 meets the requirement, and no adjustment is needed.

Receiving

Connect the interfaces of DDS unit with those of the main board.

The primary of T5 was designed to have a center tap. To simplify construction, the tap is canceled. However, the center and the right pin holes of T5 should be bridged with solder, see the red wire in the photo.

Do not connect the antenna. Use a digital meter to measure the voltage of pins 4 and 6 of U1. Adjust VR1 until voltage of pin 4 is around 1.19V, pin 6 around 0.65, or $V_4 - V_6 = 0.5V$. Now AGC works at the best condition. Never short pins 2 and 3.



Another simple way to adjust U1 is to wear earphones, adjust VR1, until you hear a relatively louder hiss sound.

Adjust T5. Listen the carefully. Turn the slug, peak the weak hiss sound until you hear a relatively louder hiss sound.

Select band 1, and try to get a signal. Or use a signal generator to generate a 7.000MHz signal. Connect the antenna. Adjust L2 and L3 to peak the received signals. Now 40 m is done.

The adjustment procedure of 20 m is the same as that of 40 m.

Transmitting

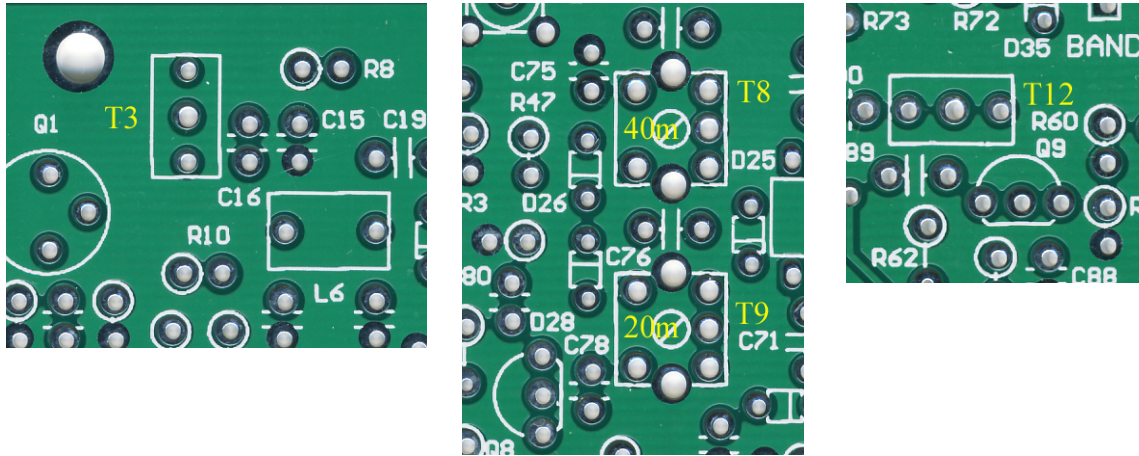
Adjustment should not be carried out until the PA transistors are fit on the casing.

Disconnect C89 to stop the transmitting signal from the main board. Connect the ampere meter in the power route of the 2078s to check the quiescent current. Connect a dummy load at the antenna. The reading is around 5 -10 mA. R9 determines the bias of the two 2078s. 2 bias resistors are supplied in the kit for you to choose. Connect C89. The quiescent current will increase a little.

Unplug the PA from the main board. Connect a RF volt meter to C71. Set the mode to CW. Shorten the KEY pins to generate a CW signal to peak T6 and T7. Now the IF of transmitting is done. Now connect the RF volt meter to C89. Set the band to 40 m. Trim T8 and T10 to peak the reading on the volt meter. Now 40 m is done. Start the adjustment of 20 m.

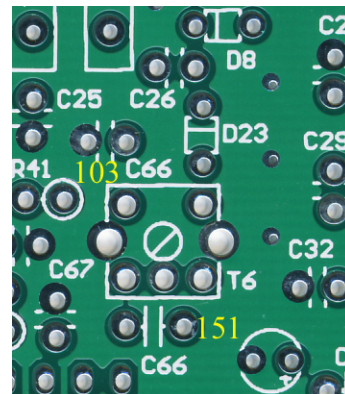
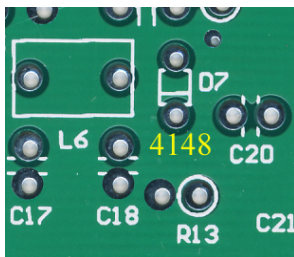
Connect the main board with the PA board. Connect the RF voltmeter to ANT with the dummy load. An ampere meter can also be put in the power circuit. Press the KEY, a RF reading of more than 15V RMS can be obtained. Set the mode to LSB, press PTT, no reading should appear. Now, talk to MIC, more than 15V RMS reading can be obtained. If a high reading appears before talking, or more than 1 A is read, the drive should be decreased. Reduce the capacitor value of C79 (222 - 103). If the output power is not enough, try to increase the capacitance of C88, or reduce the resistor value of R52 to 220 ohms.

Locations of Transformers on Main Board

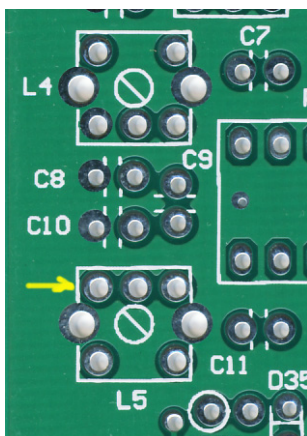


Three Silk Print Mistakes

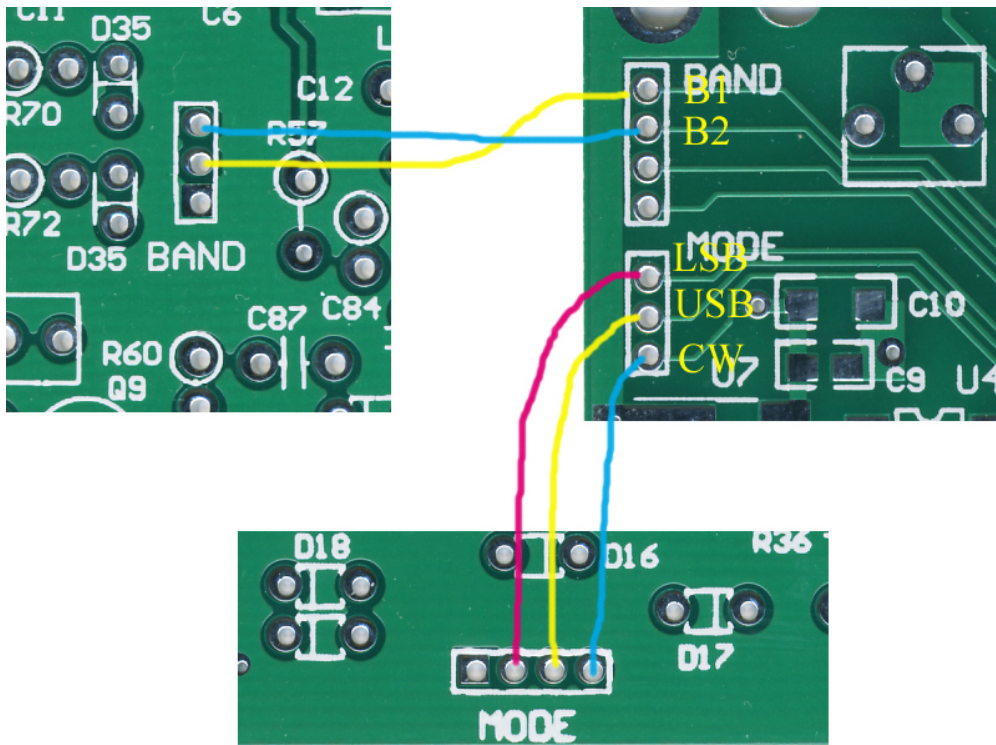
1. Two D7's are printed. The D7 beside L6 is 4148.
2. Two C66's are printed. The C66 beside D23 is 103, The C66 below T5 is 151.



3. The ground pad of L5 is not connected. Please bridge the pad to the ground with solder.



Connecting Main Board and DDS Unit



Mounting BPF and LPF Relays

Notice the printed bar of the relay:

